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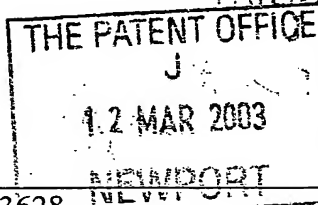
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Dated

31 July 2003

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The Patent Office

Cardiff Road
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1. Your reference

JL3628

2. Patent application number

(The Patent Office will fill in this part)

0305614.0

3. Full name, address and postcode of the or of each applicant (underline all surnames)

3M INNOVATIVE PROPERTIES COMPANY
P.O. BOX 33427
ST. PAUL
MN 55133-3427
USA

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

DELAWARE USA

07664097003

4. Title of the invention

SPRAYGUN WITH BUILT-IN RESERVOIR LID

5. Name of your agent (if you have one)

Barker Brettell

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

138 Hagley Road
Edgbaston
Birmingham
B16 9PW

Patents ADP number (if you know it)

7442494002

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Country

Priority application number
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Date of Filing
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7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

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YES

a) any applicant named in part 3 is not an inventor, or
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Patents Form 1/77

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Description 12 + 12

Claim(s)

Abstract

Drawing(s) 07 + 07



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- Request for preliminary examination -
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11. I/We request the grant of a patent on the basis of this application.

Signature

Barker Brettell

Date

Barker Brettell

11 MARCH 2003

12. Name and daytime telephone number of person to contact in the United Kingdom

DAVID WIGHTMAN/JOHN
LAWRENCE

Tel: 0121 456 1364

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Patents Form 1/77

SPRAYGUN WITH BUILT-IN RESERVOIR LID

Field of the Invention

5 This invention concerns the liquid spraying apparatus described and claimed in our co-pending UK patent application No. 0224698.1 filed on the 24 October 2002 whose specification should be read in conjunction with this application. More especially, this application further develops and describes arrangements for connecting the reservoir to the spray gun
10 that embody the principles and concepts of the invention outlined in our earlier application.

Background of the Invention

15 The invention of our co-pending application relates to the connection between a spray gun and a reservoir containing liquid to be sprayed. More especially, the invention concerns a releasable connection for detachably mounting the reservoir on the spray gun and to a spray gun adapted for such connection.

20

Our co-pending application describes and claims liquid spraying apparatus comprising a spray gun and a reservoir for a liquid to be sprayed, the reservoir having an outlet connectable to the spray gun to permit the liquid to be withdrawn from the reservoir in use, and the spray gun
25 having integral connector means arranged for non-threaded engagement with co-operating connector means on the reservoir by means of which the reservoir is releasably secured to the spray gun.

30

Summary

This application discloses liquid spraying apparatus in which the spray gun has integral connector means for releasably securing the reservoir.

5

In one embodiment, the integral connector means has an enlarged head defining a socket and the reservoir has a sidewall extending from a first end to a second end, the sidewall defining an opening at the first end and the socket receiving the first end to connect the reservoir to the spray gun.

10

In another embodiment, the integral connector means is provided with a detachable adaptor for converting the connector means to receive a threaded connector for securing a reservoir. The integral connector means may comprise a socket and the detachable adaptor an insert or plug mountable in the socket and having a threaded bore to receive a threaded connector for the reservoir. The threaded connector may be part of the reservoir or a separate component to which the reservoir is connected

15

According to another aspect, the present invention provides liquid spraying apparatus comprising a spray gun and a reservoir for a liquid to be sprayed, the reservoir having a sidewall extending from a first end to a second end and defining an opening at the first end, and the spray gun having an integral inlet connector with an enlarged head co-operable with the first end of the reservoir such that the opening is sealed in a fluid-tight manner relative to the head.

20
25

The enlarged head of the inlet connector forms a lid for the reservoir. In this way, the open end of the reservoir is closed when the reservoir is connected to the spray gun and a separate, detachable lid for the reservoir

30

is not required. As a result, the number of parts for assembly of the reservoir can be reduced and the connection of the reservoir to the spray gun simplified.

- 5 In one arrangement, the head defines a socket to receive the first end of the reservoir. The socket preferably has an annular seat engageable with the first end of the reservoir around the opening.

The first end of the reservoir may be located and retained in the socket by
10 a threaded or non-threaded connection. In one arrangement, the socket and reservoir are provided with complementary screw threads to secure releasably the reservoir. In another arrangement, the reservoir is an interference push-fit in the socket to secure releasably the reservoir. In yet another arrangement, the reservoir and socket are provided with
15 complementary non-threaded connector formations such as bayonet formations.

The inlet connector may be formed integrally with the spray gun, for example by casting or moulding. Alternatively, the inlet connector may
20 be formed separately and permanently secured to the spray gun, for example by welding or adhesive bonding.

The reservoir may comprise a rigid pot with an openable air vent at the second end to allow air to enter as liquid is withdrawn from the reservoir
25 in use. More preferably, the reservoir comprises an outer container and an inner liner, the liner being collapsible as liquid is withdrawn from the reservoir and separate from the outer container so that the liner can be removed and thrown away after use.

According to yet another aspect, the present invention provides a spray gun adapted for mounting a reservoir by any of arrangements described in this application or our earlier application.

- 5 There now follows a description of embodiments of the connector means for releasably securing the reservoir to the spray gun with reference to the following drawings (numbered to follow on from those of our co-pending application) in which:

10 **Brief description of the drawings**

Figure 11 is a perspective view of a spray gun with an alternative integral connector according to the invention;

- 15 **Figure 12** is a section, to an enlarged scale, showing a reservoir attached to the integral connector of **Figure 11**;

Figure 13 is a section, similar to **Figure 12**, showing a modification to the reservoir;

20

Figure 14 is a perspective view of a spray gun with an integral connector according to the invention and a removable insert for converting the connector to receive a threaded connector for attaching a reservoir;

- 25 **Figure 15** is a perspective view showing a threaded connector connected to the spray gun shown in **Figure 14**;

Figure 16 is a perspective view showing a reservoir connected to the spray gun shown in **Figures 14** and **15**;

30

Figure 17 is a section through the integral connector and insert of the spray gun shown in Figure 14 and showing the threaded connector of Figure 15 separate from the insert;

- 5 Figure 18 is a perspective view of a spray gun showing a modification to the connector of Figure 11 according to another aspect of the invention; and

10 Figure 19 is a section, to an enlarged scale, showing a reservoir attached to the integral connector of Figure 18.

Detailed Description of the Exemplary Embodiments

15 Referring first to Figures 11 and 12 of the accompanying drawings, there is shown another arrangement for releasably securing the reservoir to the spray gun. For convenience, like reference numerals in the series 300 are used to indicate parts corresponding to the embodiments of our earlier application which should be read in conjunction with the following description.

20

In this embodiment, the spray gun 301 is provided with an external connector boss 320 integral with the spray gun body 303. The connector boss 320 extends upwardly from the top of the body 303 and has an enlarged annular head 360 defining a socket 321 shaped to receive the open end of a disposable liner 309 and an outer container 308 for the liner 309.

25

The rim 312 of the liner 309 locates on an annular seat 361 within the socket 321 with an annular clearance gap 362 between the sidewall 309b of the liner and the opposed sidewall 321b of the socket.

30

The sidewall 321b of the socket 321 is smooth and tapers slightly towards the base of the socket 321. The liner 309 is held in place by push fit of the open end of the outer container 308 in the clearance gap 362 to secure
5 the rim 312 of the liner 309 between the seat 361 and the open end of the container 308. The container 308 is retained by frictional engagement with the tapered sidewall 321b of the socket 321 and ensures a fluid-tight seal between the liner 309 and the socket 321.

10 Inwardly of the seat 361, the base of the socket 321 is of conical shape and tapers towards a central opening to a bore 324 of reduced diameter relative to the socket 321 that provides an inlet for delivery of paint from the reservoir 302 to the spray gun 301. In this way, paint flows towards the inlet and dead spaces where paint may become trapped are avoided.

15 The bore 324 may contain a removable filter (not shown) for filtering paint as it is withdrawn from the reservoir to remove any solid particles. Alternatively or additionally, the paint may be filtered when added to the reservoir 302.

20 In use, the outer container 308 can be stood upright on its base and the liner 309 inserted in the open end to position the rim 312 over the open end. Paint or other liquid to be sprayed can be added to the liner 309 and mixed therein.

25 The assembly of the liner 309 and container 308 can then be presented to the socket 321 with the gun 301 in an inverted position so that socket 321 is facing downwards and pushing the open end of the assembly into the socket 321 to secure the outer container 308 and seal the liner 309
30 relative to the socket 321.

The gun 301 can then be inverted to its normal upright position for spraying with the liner 309 and container 308 being held in place by the frictional engagement of the container 308 in the socket 321. The liner
5 309 collapses as paint is withdrawn and air is admitted to the interior of the container 308 through the air hole 308a in the bottom of the container 308.

On completion of spraying, the assembly of the liner 309 and container
10 308 can be detached from the gun 301 and the liner 309 thrown away. A new liner 309 can be fitted in the container 308 and the assembly re-attached to the gun 301 after cleaning the paint contaminated parts of the gun 301 to spray another paint or liquid.

15 If there is any paint remaining in the liner 309 after spraying, this may be stored in the liner 309 temporarily by attaching a cap (not shown) to close the open end of the liner 309. The cap can be removed and the assembly of the liner 309 and container 308 re-attached to the spray gun 301 to use the paint.

20

As will now be appreciated, by forming the connector boss 320 on the spray gun 301 with a socket 321 to receive the open end of the liner 309 and by using the outer container 308 to secure the liner 309 by push fit in the socket 321, the connector boss 320 effectively forms the lid of the
25 reservoir 302.

In this way, the number of parts is reduced and assembly of the reservoir 302 and connection to the spray gun 301 is simplified. Also, on completion of spraying, only the liner 309 has to be thrown away and
30 replaced providing a potential cost saving for the end user.

In a modification, shown in Figure 13, the outer container 308 is replaced by a tubular sleeve 370 open at both ends allowing liners 309a, 309b, 309c, 309d of different length to be secured with a common connector sleeve 370. In this way, the volume of the reservoir 302 can be varied according to the area to be sprayed by selecting and fitting the appropriate size of liner 309a, 309b, 309c, 309d with the same connector sleeve 370 thereby reducing the number of components required to fit reservoirs having a range of volumes.

10

The sleeve 370 may be used with liners 309 that are contained wholly or partly within the sleeve 370. Thus, in Figure 13, the sleeve 370 is shown to be longer than each of the liners 309a, 309b, 309c so that each liner 309a, 309b, 309c is protected and supported over the whole of its length by the sleeve 370. This is not essential, however, and the sleeve 370 is also shown in Figure 13 to be shorter than liner 309d so that the liner 309d projects from the free end of the sleeve 370 and is protected and supported over part of its length only by the sleeve 370.

15

It will be understood that the socket 321 and container 308 may be provided with any suitable non-threaded connectors to secure releasably the reservoir 302 to the connector boss 320. For example, the socket 321 and container 308 may be provided with co-operating bayonet formations or co-operating snap engageable formations.

20

Moreover, it will be understood that the connector boss 320 may be used to attach a reservoir to the spray gun 301 that does not have a liner 309. For example, the outer container 308 may have a solid base provided with an openable air hole to allow air to enter as paint is withdrawn.

25

30

Referring now to Figures 14 to 17 of the accompanying drawings, there is shown another arrangement for releasably securing the reservoir to the spray gun. For convenience, like reference numerals in the series 400 are used to indicate parts corresponding to the embodiments of our earlier application which should be read in conjunction with the following description.

In this embodiment, the spray gun 401 is provided with an integral connector boss 420 in the form of a socket 421 and a separate detachable insert 480 for reception in the socket 421.

In certain embodiments the insert 480 is a plastics moulding that is releasably secured in the socket 421 by push fit and has an annular flange or collar 481 at the outer end that locates on the rim of the socket 421. The insert 480 is retained in place by friction.

It will be understood, however, that any suitable non-threaded means may be provided to secure releasably the insert 480. For example the socket 421 and insert 480 may be provided with co-operating bayonet formations or snap engageable formations.

The insert 480 has a through bore 482 with an internal screw thread 483 for engagement of a complementary external thread 484 at one end of a mating adaptor 485. The adaptor 485 has a through bore (not shown) and is provided at the other end with an external flange 422 for co-operating with hook members 416, 417 on the reservoir 402 to secure releasably the reservoir 402 to the spray gun 401.

The flange 422 and hook members 416, 417 are similar to the parts shown in Figures 5 and 6 of our earlier application to which the reader is

directed for a description of the method by which the reservoir 402 can be attached to and detached from the spray gun 401.

It will be understood, however, that the reservoir 402 and adaptor 485
5 may be provided with any suitable complementary co-operating formations to secure releasably the reservoir 402 to the spray gun 401. For example co-operating bayonet formations or snap engageable formations. Alternatively, the reservoir 402 and adaptor 485 may have co-operating screw threads.

10

As will be apparent, the insert 480 converts the socket 421 to receive a screw threaded member for mounting the reservoir 402. In this embodiment, the screw threaded member is a separate adaptor 485 to which the reservoir 402 is releasably secured. It will be understood,
15 however, that this is not essential and that the screw threaded member could be an outlet of the reservoir that screws directly into the insert 480 without requiring the adaptor 485.

The insert 480 is a separate component and can be removed from the
20 socket 421 if a threaded connection is not required to connect a reservoir to the spray gun 401. In this way, the socket 421 can be adapted for non-threaded connection of a reservoir by removing the insert 480 from the socket 421 or threaded connection of a reservoir by positioning the insert 480 in the socket 421.

25

In this embodiment, the adaptor 485 screws into the insert 480 within the socket 421. In this way, the screw threaded engagement of the adaptor 485 with the insert 480 may enhance the frictional engagement between the insert 480 and the socket 421. As a result, the reservoir 402 may be
30 secured in a fluid-tight manner that reduces the risk of inadvertent

separation of the reservoir 402 from the spray gun 401 as the spray gun 401 is manoeuvred in use.

Referring now to Figures 18 and 19 of the accompanying drawings, there
5 is shown a modification to the arrangement of Figures 11 and 12 for releasably securing the reservoir to the spray gun. For convenience, like reference numerals in the series 500 are used to indicate parts corresponding to the Figures 11 and 12.

10 In this embodiment, the enlarged annular head 560 of the connector boss 520 is provided with an internal screw thread 590 and the outer container 508 of the reservoir 502 has a complementary external screw thread 591. In this way, the outer container 508 can be screwed into the head 560 to secure the liner 509 in fluid-tight manner relative to the head 560.

15 The outer container 508 could be replaced by an open-ended sleeve (not shown) for mounting liners of different length to vary the volume of the reservoir 502 as described previously in connection with Figure 13. Alternatively, the liner 509 could be omitted and the outer container 508
20 provided with an openable air inlet in the base. In this way, liquid can be added directly to the container 508 for mounting on the spray gun 501.

As will be appreciated, the enlarged head 560 of the connector boss 520 forms a lid for the open end of the reservoir 502 reducing the number of
25 parts and facilitating connection of the reservoir 502 to the spray gun 301 in a simple manner.

In a modification, not shown, the internal screw thread 590 on the head 560 may be replaced by an external screw thread and the outer container
30 508 replaced by an annular locking ring or collar having an internal screw

thread and a concentric inner sleeve or skirt. The inner sleeve is spaced from the internal screw thread and is received in the clearance gap between the head 560 and the liner 509 when the collar is screwed onto the head to secure and retain the liner 509 in the socket 521.

5

In another modification, not shown, the inlet connector 320, 520 with enlarged head 360, 560 may be a separate component for securing releasably to the spray gun 301, 501 and the invention includes provision of such a connector for mounting a reservoir to the spray gun.

10

The invention also includes any novel feature or combination of novel features described herein when applied to a method or apparatus for spraying a liquid as defined in our earlier application.

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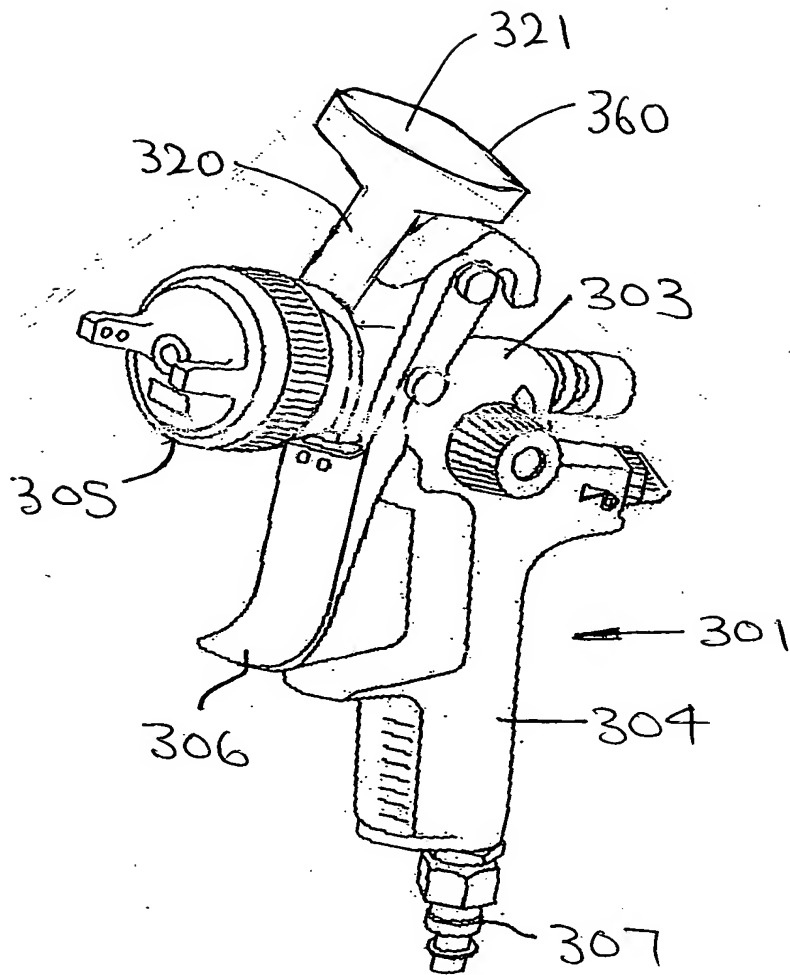


FIGURE 11

217

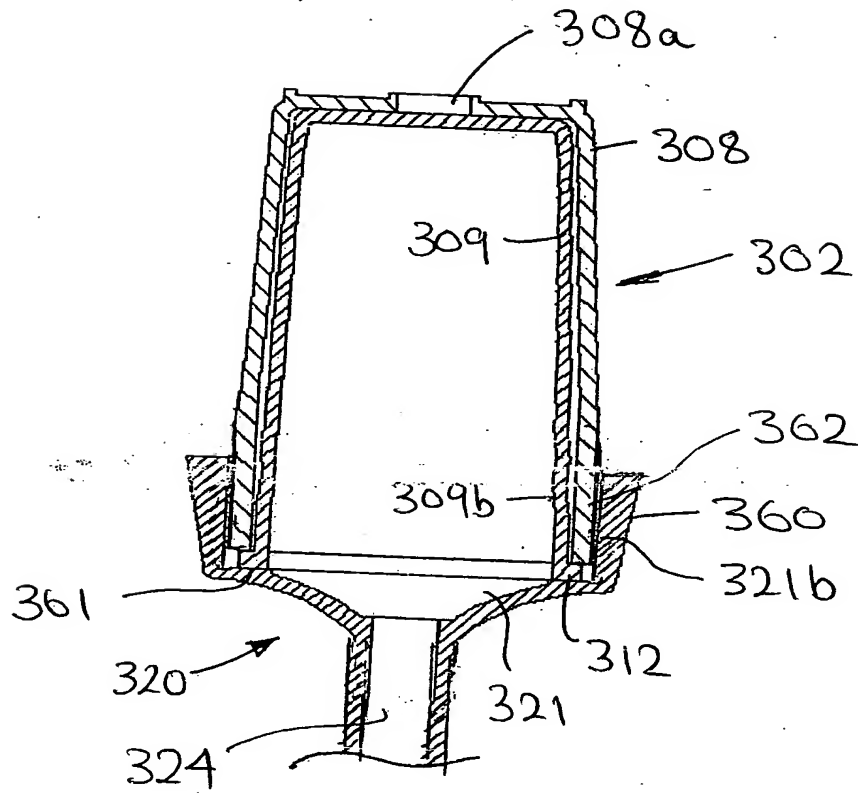


FIGURE 12

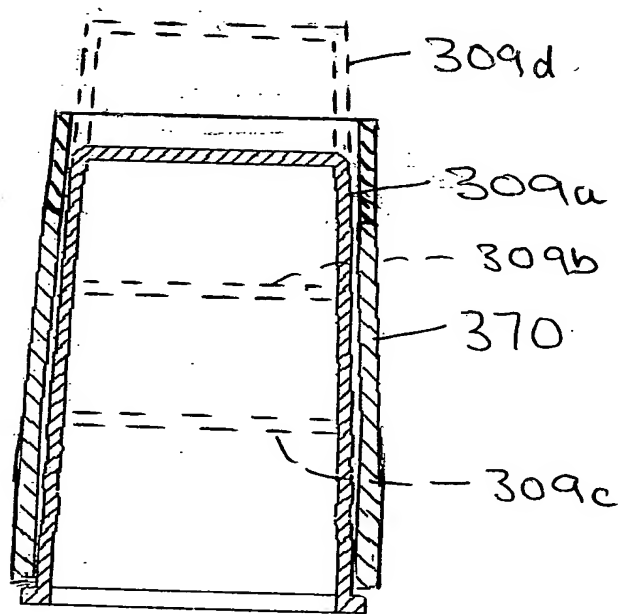


FIGURE 13

417

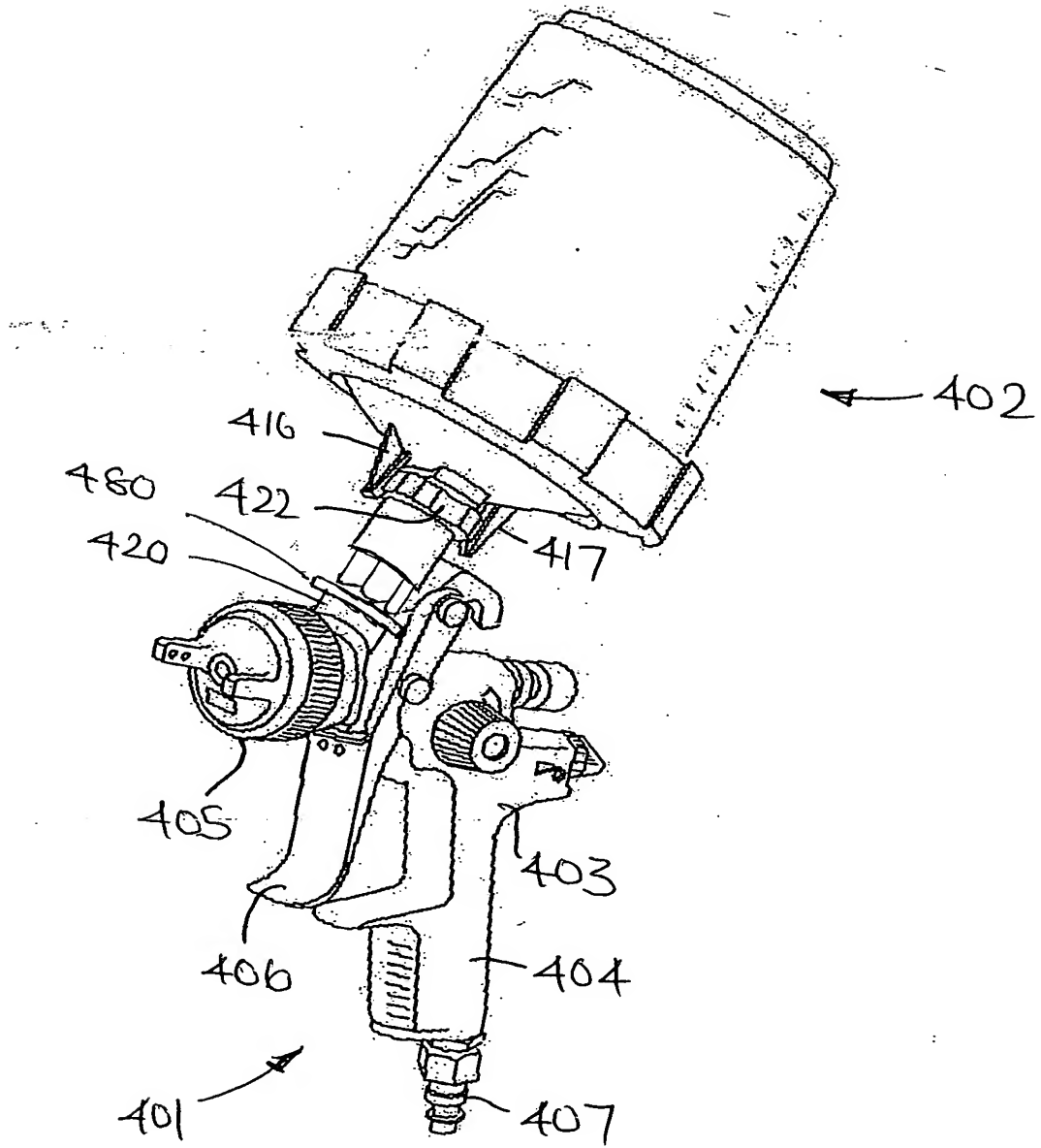


FIGURE 16

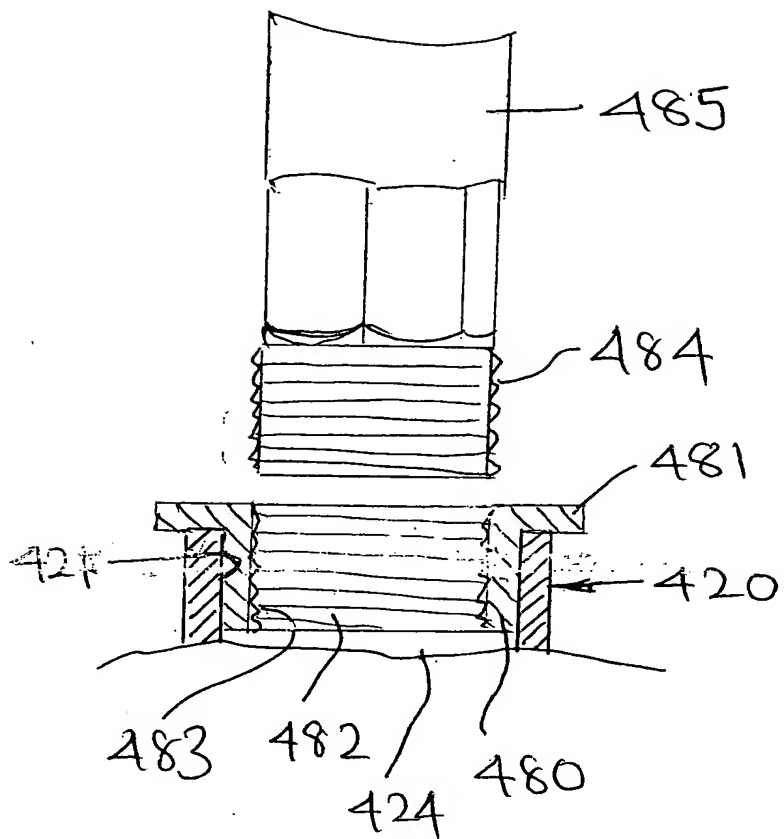


FIGURE 17

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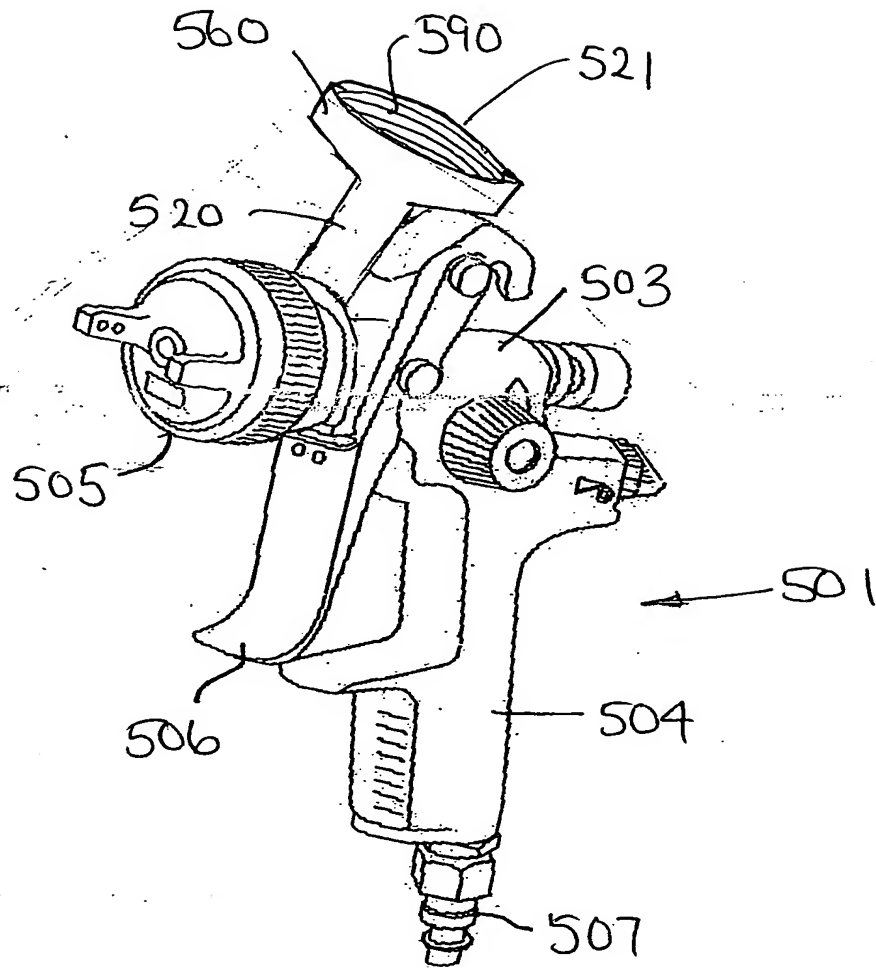


FIGURE 18



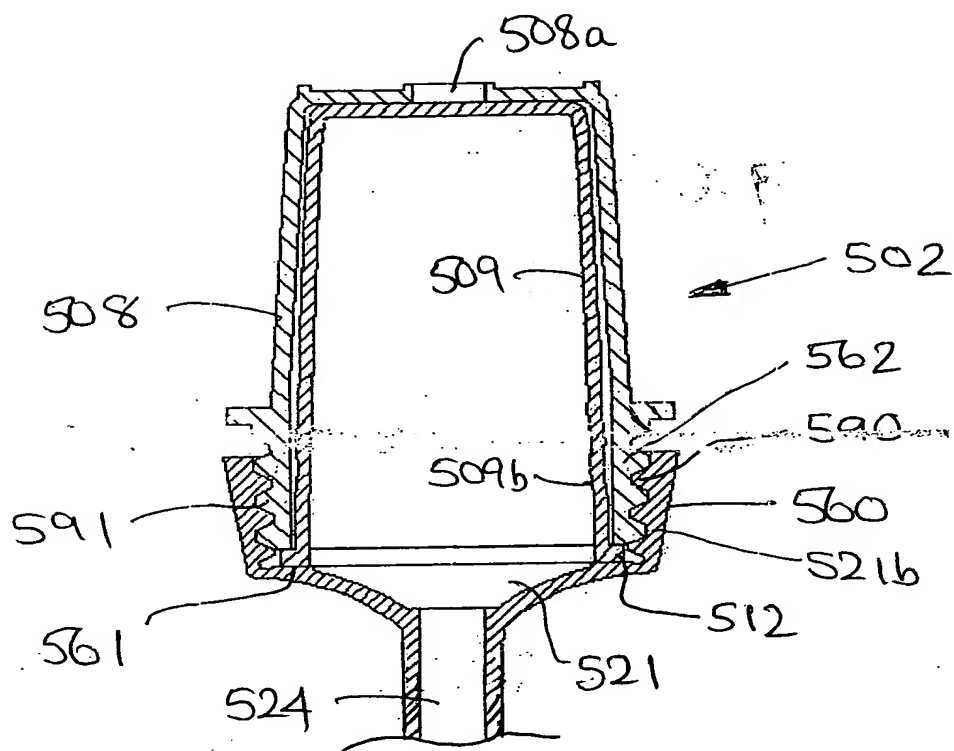


FIGURE 19

